

REMARKS

The applicant respectfully request reconsideration in view of the amendment and the following remarks. The applicant has incorporated claims 2 and 3 into claim 1 in order to further defined what is meant by good solvents for A and B and poor solvent for solvent C. The applicant has amending claim 1 by adding the feature, "which the boiling points of all solvents A, B and C are greater than 80°C". Support for this feature is can be found in the specification of the present application at page 10, lines 15-16. The applicant has amended claim 9 to be dependent upon claim 6 in order to over come the 35 U.S.C. 112, second paragraph rejection. The applicant has deleted the preferably language from claim 19. Support for newly added claim 27 can be found in the preferable language from claim 19. Support for newly added claims 28 and 29 can be found in the specification at page 10, lines 15-16. No new matter has been added.

The applicant has cancelled two claims and added three claims. The applicant authorizes the USPTO to charge \$52.00 for the extra claim over twenty that was added.

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-3, 7, 10-13, and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bae et al., U.S. 2003/0127977(Bae). Claims 1-4, 6-13 and 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Cao et al., US 5,232,631(Cao). Claims 1-13 and 16-20 are rejected under 35 U.S.C. 102(a)/(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yu et al., US 2005/0014023 (Yu). Claims 1-13 and 16-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Brown et al., (WO 02/45184; equivalent U.S. 2004/0038459) (Brown). Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Cao or Bae or Yu or Brown. The applicant respectfully traverses these rejections.

Rejections under 35 U.S.C. 112

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The applicant has amended claim 9 to be dependent upon claim 6 in order to overcome the 35 U.S.C. 112, second paragraph rejection. For the above reasons, this rejection should be withdrawn.

Prior Art Rejections

Claims 1-3, 7, 10-13, and 17-20 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bae. Claims 1-4, 6-13 and 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Cao. Claims 1-13 and 16-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Brown. Claims 1-13 and 16-20 are rejected under 35 U.S.C. 102(a)/(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yu. Claims 1-13 and 16-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Brown. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao or Bae or Yu or Brown.

According to the applicant's independent claim (claim 1) the applicant's claim single-phase liquid compositions comprising - at least one organic semiconductor,

- at least one organic solvent A,
- at least one organic solvent B and
- at least one organic solvent C, .

The solvents are characterized in that solvents A and B are "good" solvents for the organic semiconductor whereas solvent C is a "poor" solvent for the organic semiconductor. All the solvents A, B and C requires the boiling points are greater than 80°C. The solvents must furthermore have specific boiling points (i.e.: $b.p.(A) < b.p.(C) < b.p.(B)$) and/or specific partial vapour pressures (i.e.: $p(A) > p(C) > p(B)$).

From the above-said follows, that the solvents of the claimed solutions must fulfill different requirements. Only solutions fulfilling these requirements are able to solve the problems known from the prior art (i.e.: problems 1 to 6; see the specification of the present application, pages 2-3) which state:

- Problem 1: Solvents having an excessively high vapour pressure, i.e. having an excessively low boiling point, result in the IJ solutions drying in the print head, on the nozzle or on the nozzle plate. This has the consequence that the nozzle can become blocked and the printing process becomes difficult to reproduce. A system of this type is unsuitable for industrial manufacture.
- Problem 2: If the IJ solution comprises different materials (blends), it may occur during drying of the solution that one of these substances precipitates first. This results in an inhomogeneous distribution of the various materials in the pixel formed. Pixels which are inhomogeneous in this way exhibit a significant impairment of the device properties in the OLED.
- Problem 3: During drying of the individual drops of the IJ solutions on the substrate, it may occur that the layer thickness of the pixel formed varies greatly. In general, the edges of the pixel are significantly higher than the centre of the pixel. This results in an inhomogeneous luminous intensity within the pixel in the PLED and also in different degradation of the various regions of the pixel.
- Problem 4: If the solution dries too slowly in the printed-on pixels or if the viscosity changes only relatively little during the drying process, it

may occur during movement of the substrate (in industrial IJP, the substrate is generally conveyed in one direction, the print head moves perpendicular thereto) that solution flows over the pixel boundary (the pixels are generally delimited by photolithographically produced walls). A mixture of the inks is harmful, in particular, if this causes solutions of different colour to mix. The undesired layer-thickness variations and resultant inhomogeneities always result in unreproducible emission behaviour.

- Problem 5: It is necessary to remove the solvent as completely as possible from the deposited film in order to obtain optimum device properties. If the solvent has an excessively low vapour pressure (i.e. an excessively high boiling point), this is only possible, if at all, with considerable technical complexity.
- Problem 6: If the solution in the printed-on pixels dries too quickly, there is a risk that the organic semiconductor will precipitate from the solution. This generally results in inhomogeneities of the film formed and thus in inhomogeneities in the electroluminescence.

The applicant believes that the closest prior art is Bae. Bae discloses organic electroluminescence displays and a method of fabricating the same (see the title and the abstract). Bae also discloses solutions of polymeric organic semiconductors in organic solvents. In one embodiment of Bae the solvent includes three materials, i.e. a first, a second and a third solvent (paragraph [0045]).

Bae states in paragraph [0045]:

...The first solvent may include one of Xylenes, Tetralin, Cyclo Hexyl Benzene, Chloro Form, Tetra Hydro Furane, Ethyl Benzoate, and Methyl Benzoate. The second solvent may include one of Cyclo Hexyl Pyrrolidone, N-Methyl-2-Pyrrolidone (NMP), .gamma.-Butyrolactone, Ethylene Glycol, Dodecane, Ethyl Cinamate. The third solvent may include one of 2-Butoxy Ethanol, Methylene Chloride, Acetone, n-Butyl Benzene, Toluene, iso-Pentyl Ether, and iso-Butyl Benzene

The question, which now must be answered, is the following:

Is there a "teaching, suggestion or motivation" given in Bae to select from the disclosed solvent three solvents in such a manner that they fulfill the requirements of pending claim 1?

The answer to the question is No! The reasons are the following:

Each group of solvents described in Bae (i.e. first, second and third solvent) contains solvents having very low as well as very high boiling points (b.p.). For example, as first solvents, chloroform and tetrahydrofuran are mentioned, having boiling points of 61°C and 66°C, respectively. Furthermore, as third solvents, methylenechloride and acetone are mentioned, having boiling points of 40°C and 56°C, respectively. These solvents are excluded from amended claim 1 which requires the boiling points of all solvents A, B and C are greater than 80°C.

Furthermore, all three groups of solvents contain solvents with high boiling points, e.g. methylbenzoate as first solvent (b.p.: 198°C), N-methyl-2-pyrrolidone as second solvent (b.p.: 202 °C and for N-methyl –pyrrolidone 199°C and butylbenzene as third solvent (b.p.: 169°C).

Additionally, all three groups of solvents contain solvents which are "good" solvents for the organic semiconductor, e.g. xylene as first solvent, N-methyl-2- pyrrolidone (NMP) as second solvent and toluene as third solvent, but the groups also contain solvents which are "poor" solvents for the organic semiconductor, e.g. ethyleneglycol and dodecane as second solvent and butylbenzene as third solvent.

The properties of the solvents described above are derived from the disclosure of the present application, especially tables 1 and 2.

Therefore the applicant believes that there is no "teaching, suggestion or motivation" in Bae to select three solvents in such a manner that they fulfill the requirements of claim 1 of the

present application. Consequently, claim 1 of the present application is not obvious with respect to Bae.

Claim 1 of the present application is also not anticipated or rendered obvious with respect to the other applied references by the Examiner for the same reason, as described below.

Cao discloses solutions and plasticized compositions of electrically conductive polyanilins (see the abstract). First of all, the Examiner will note that polyaniline is an organic **conductive material**, whereas according to the present application a solution of an organic **semiconductive material** is claimed.

It is correct, as stated by the Examiner, that the polyaniline can be dissolved in a variety of solvents including mixtures of solvents. However, the only disclosure is the statement at the bottom of col. 13 which states:

"Mixtures of such organic solvents can also be used as for example mixtures of xylene and chlorobenzene". (emphasis added)

The applicant believes that this statement is neither a disclosure for a mixture of three solvents nor a disclosure for a mixture of three solvents fulfilling the requirements of claim 1 of the present application.

Yu discloses aromatic monomer- and conjugate polymer-metal complexes (see the title and the abstract). In paragraph [0072] of Yu different solvents for the polymer are disclosed. It is also mentioned that it is possible to use **"combinations thereof"**.

The applicant believes that this statement is neither a disclosure for a mixture of three solvents nor a disclosure for a mixture of three solvents fulfilling the requirements of claim 1 of the present application.

Brown discloses field effect transistors and materials (i.e. organic semiconductors) and methods for their manufacture (see the abstract and the title). In paragraph [0054] of Brown, different solvents for the organic semiconductor are disclosed. It is also mentioned that it is possible to use "**mixtures thereof**".

In this statement the applicant believes that Brown does not disclose a mixture of three solvents nor a disclosure for a mixture of three solvents fulfilling the requirements of claim 1 of the present application.

A statement that modifications of the prior art to meet the claimed invention would have been "obvious to one of ordinary skill in the art at the time the invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See MPEP § 2143.01 IV. "[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Furthermore, the Examiner cannot selectively pick and choose from the disclosed parameters without proper motivation as to a particular selection. The mere fact that a reference may be modified to reflect features of the claimed invention does not make the modification, and hence the claimed invention, obvious unless the prior art suggested the desirability of such

modification. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430 (Fed. Cir. 1990); *In re Fritch*, 23 USPQ2d 1780 (Fed. Cir. 1992). Thus, it is impermissible to simply engage in a hindsight reconstruction of the claimed invention where the reference itself provides no teaching as to why the applicant's combination would have been obvious. *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991). For the above reasons these rejections should be withdrawn.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

A fee for \$52.00 is enclosed for the extra claim over twenty. Applicant believes no additional fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 14113-00041-US from which the undersigned is authorized to draw.

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Respectfully submitted,

Electronic signature: /Ashley I. Pezzner/
Ashley I. Pezzner
Registration No.: 35,646
CONNOLLY BOVE LODGE & HUTZ LLP
1007 North Orange Street
P. O. Box 2207
Wilmington, Delaware 19899-2207
(302) 658-9141
(302) 658-5614 (Fax)
Attorney for Applicant